END USER COMPUTING (EUC)
TRANSFORMATION OPTIONS

Sundesh Pawar

Disclaimer:
All Picture and Trademark names are property of their respective companies. Information contained in this publication has been obtained by sources considered to be reliable but is not warranted by Author. This publication may contain opinions of Author, which are subject to change from time to time.
1 Introduction

This Whitepaper describes how best to deliver modern, usable, high-performing end user computing for any organization. It explores various offerings available around Desktop Virtualization, Desktop Image Management, Application Virtualization, User State virtualization and Cloud offerings that will revolutionize the End User Desktop experience.

2 Scope

For the purpose of this report, the end user computing environment is considered to comprise:

- One or more devices — for example, PC, laptop, tablet, slate, or smartphone.
- The operating system with which the end user interacts, and associated security.
- Application Readiness and Provisioning Infrastructure.
- Desktop Infrastructure and image management.
- Any infrastructure services required for user administration, security, and management.
- The collaboration services that end users require to be productive.

3 Challenges in a traditional EUC strategy

End user computing (EUC) is the very fundamental part of any organization that leverages computing as one of its core resource to full fill its deliverables. Normally IT Operations or IT services team are the ones who own this piece. This team could be part of a company, however it’s observed that many of the companies have offloaded this task and outsourced to external vendors because it brings in its own challenges that may not be core competency of the company. Following are some of the commonly seen challenges of EUC:

- High Total Cost of Ownership.
- High CAPEX and OPEX.
- High Operational overheads in terms of Support, Maintenance and up gradation
- Security and compliance loopholes
- Traditional Desktop environment is Tightly coupled (as seen in picture) where in any failure in the lower layers will impact all the above layers
- Inconsistent User Experience
- Limited or No Flexibility to work from anywhere

4 EUC transformation with Dynamic Workplace Approach

Driven by mobility and consumerization, many organizations are transitioning away from traditional fixed-asset environments and towards a user-driven landscape centered on flexible bring-your-own-device (BYOD) policies and anywhere, anytime computing. Although these trends have led to improved employee and constituent productivity and satisfaction, they have challenged IT with the task of manually securing, updating, and patching the growing number of endpoints—often consumer devices—that are accessing the corporate network.
A traditional desktop or laptop has been a tightly coupled component architecture, which means that failure of a layer will need rebuilding of the failed layer and layers above it. Example OS crash will need rebuild of OS, applications and user specific settings. This results longer cycle time for users to be productive.

By decoupling the various layers of the traditional model so as to ensure each layer can work with no or minimum dependency of the layer above or below will help organization move towards a Dynamic Workplace. Currently the technology to enable the dynamic workplace has evolved over the years, however we will continue to see these technologies maturing in years to come.

The primary technologies for the Dynamic Workplace are:

1. **Hardware Abstraction.**
2. **Desktop Virtualization or Centralized Desktop management**
3. **Application Virtualization**
4. **User State Virtualization**

The following sections will provide more details of the technology and the product options for each of the stack.

## 5 Hardware

### 5.1.1 Hardware Abstraction

Unlike the traditional End User computing environment, where End user devices primarily were confined to either Desktops or Laptops running on Windows OS, the past decade has witnessed an evolution of variety of devices like Notepads, Tablets, Smart Phones, and Network bootable devices such as Zero Client and Thin Clients. All these clubbed with various flavors of OS like Android, IOS, MAC, Windows provides a range of choices to choose from. This has led to Consumerization of IT and Bring Your Own Devices (BYOD) have become a norm of the dynamic workplace and something that enterprise have to factor and accommodate in their EUC strategy.
5.2 Operating System

5.2.1 Desktop Virtualization

Virtualization has been existent for some time now, however most of it was relevant on Server front. Server Virtualization never faced challenge in terms of its adoption as it never directly impacted the End users. In Contrast, Desktop Virtualization adoption has been a challenge because there are lot of dependencies in terms of magnitude of implementation, resources and delivery methodology, end user adoption, Application delivery and consistent experience. Over the last few years there has been lot of work gone in making the Desktop Virtualization a reality and is becoming practically feasible alternative for a traditional Desktop model. Desktop Virtualization primarily can be categorized into two forms. On-Premise Desktop Virtualization and Cloud-Based desktop Virtualization. We shall look at each of the available options in detail:

5.2.1.1 On Premise Desktop Virtualization Solutions

While implementing Desktop Virtualization On-Premise, it can be either a Session based Desktop Virtualization (earlier referred to as Terminal Services) or Virtual Desktop Infrastructure (Popularly known as VDI). The main Product Vendors who provide the Desktop Virtualization Infrastructure capability On Premise are: Citrix XenDesktop, VMware Horizon View and Microsoft Remote Desktop Services (RDS). All three of them do provide different features and capability. Let us take a dig into these technologies to understand how they fit in EUC strategy.

Session Virtualization: This was, and is still the most effective way of implementing the Desktop Virtualization, provided the users do not need too much control on desktop session and the application are compliant to run on the Server Operating System. The Session Virtualization provides the highest consolidation of Desktops compared to VDI (covered next). With Desktop experience feature available on the Server OS, this should be the first sought after alternative. Off course, you will miss the Client OS such as XP / Win7 / Win8 if that is what impresses you the most. One important thing to note here is that Microsoft Remote Desktop Services (formerly referred as Terminal Services) is the one and only Vendor supporting this technology. All the other vendors like Citrix and VMware just provide the capability to implement this feature and manage it using their interface with some more additional capabilities.
**Virtual Desktop Infrastructure (VDI):** VDI on the other hand provisions the actual Virtual machines which run the Client Operating systems like Windows XP /7 / 8 to the users. The Master copy or Template is used to clone the VM’s to the required numbers. Unlike Session Virtualization there will be only one active session allowed to any active VM instance with single user allowed to work on it. We can further generalize VDI based on the way they are provisioned to End users. The VMs can be either shared between the groups of End Users or it can be dedicated. The choice of implementation depends on the End User categorization. Below listed are 2 common ways to provision the VM’s to end Users:

- **Shared (Pooled) VDI:** Here the Set of VM’s are assigned to Set of users. It’s like “Many-to-Many” relationship. No single user and no single VM will be dedicated to each other. Number of Users and Number VM’s need not match. Thus we can opt for either Over Provisioning of VM’s (to make it fault tolerant) or Under Provisioning (Cost Effective) while implementing the VDI solution.

- **Dedicated (Personal) VDI:** Here one VM will be dedicated to one user. Its “One-to-One” mapping between VM and User. Number of Users should match the Number of VM’s available. Every time a User logs in to the VM, (S)he shall receive the same VM that they were entitled to use.

**5.2.1.2 Cloud Based Desktop Virtualization Solution or Desktop as a Service (DaaS)**

DaaS is usually referred to as a Cloud Hosted Virtual Desktops. Here the entire Infrastructure is hosted by the Service Provider and only remote administration, Management and provisioning capabilities are provided to the Customers. Organizations opting for this model will just have to pay for the subscription on a monthly basis. In Public Cloud space the main players are VMware, Amazon and Microsoft.
VMware Horizon Air Desktops and Apps

VMware along with its Partners is trying to establish itself with VMware Horizon Air Desktops and Apps (formerly known as VMware Horizon® DaaS®) to deliver virtual workspaces to their end users—including full Windows Client desktops, shared desktops and applications—as a monthly subscription service. While there is lot of benefits in terms of Flexibility, Manageability, Security, Performance and Cost effectiveness, however its availability is limited to only US and UK region. Currently Windows XP, Windows 7 Enterprise, 32- and 64-bit versions of Windows 7, and Windows 8 are supported as a Dedicated Desktops and Windows Server with a client interface is also supported as part for Session Virtualization.

Windows Azure Desktop Hosting Services Solution

Windows Azure Desktop hosting Services is nothing but, having Session Virtualization on the Cloud leveraging the Infrastructure as a Service (IaaS) to achieve this. Though earlier Microsoft did not support the RDS session based desktops on the Cloud, now they have started supporting RDS on Cloud by allowing Subscriber Access License (SAL) or Service Provider License agreement (SPLA). It’s practically possible to implement this Solution either by using Citrix or RDS as connection broker. The Organization opting for this solution will get the infrastructure but entire RDS implementation should be undertaken completely by themselves. Unlike VMware and Amazon this is not an Out of the Box solution. Majority of configuration still needs to be owned by the End customer.
Amazon Workspaces
Amazon WorkSpaces is also Session Virtualization on the Cloud. However it’s a ready solution available from Amazon. In earlier section, we had the IaaS instances of Server VM’s and rest of the configuration had to be done on our own thus providing more flexibility in terms of management and configuration. But in Amazon workspace, we will be getting a standard windows 7 Desktop experience on Windows 2008 R2 from readily available set of options to choose from. Each WorkSpaces user can install the client application on the device of their choice. After a quick download, they have access to a complete Windows 7 experience in the cloud, with persistent storage, bundled utilities and productivity applications, and access to files and other resources on the corporate intranet. As this is a relatively new offering from Amazon, there is not much information available in terms of End User experience. Amazon workspace and Azure RemoteApp (discussed later) are similar offerings but Azure RemoteApp provides access to only Applications directly and no Desktop experience as such. Another important thing to note here would be that the underlying architecture used is still Windows 2008R2 and it will definitely lack all the new features and capabilities around Windows 2012R2.

5.2.2 Centralized Desktop Management
While Desktop virtualization is a suitable option for temporary workers, task workers, BYOD users etc. A majority of the desktop or laptop users may not utilize Virtual Desktop and enterprises will still need to ensure a holistic End User Desktop/Laptop management. In this space, the key solutions that provide Centralized Desktop Management are: Microsoft System Center Configuration Manager (SCCM) and VMware Mirage. Following sections will briefly cover some of the distinguishing factors around this solutions

5.2.2.1 Microsoft System Center Configuration Manager (SCCM)
SCCM is more suitable for managing an entire Enterprise’s On-Premise infrastructure. It plays a much bigger role than just Desktop Management. It helps you deliver more effective IT services by enabling secure and scalable Operating System & Application deployment, compliance settings management, and comprehensive asset management of servers, desktops, laptops, and mobile devices. Though SCCM doesn’t directly provide a Centralized Desktop image management as it’s done with Mirage, the approach here is different. Following is some of the capabilities with respect to Desktop Management:

- Operating system deployment: Provides a tool to create operating system images. You can then use these images to deploy them to computers that are managed by
Configuration Manager and to unmanaged computers, by using PXE boot or bootable media such as a CD set, DVD, or USB flash drives.

- **Software updates:** Provides a set of tools and resources that can help you manage, deploy, and monitor software updates in the enterprise.
- **Endpoint Protection:** Provides security, antimalware, and Windows Firewall management for computers in your enterprise.
- **Compliance settings:** Provides a set of tools and resources that can help you to assess, track, and remediate the configuration compliance of client devices in the enterprise.

SCCM also provides a set of tools and resources that can help you create, manage, deploy, and monitor applications in the enterprise. Following are some of the capabilities with respect to Application management:

- **System Center 2012 Configuration Manager** supports the management of virtual applications that are created with Microsoft Application Virtualization (App-V). When you use Configuration Manager to manage App-V applications, Configuration Manager takes over the management and streaming components of a typical App-V infrastructure.
- By using deployment types with applications, you can create one application which contains multiple installation files for a software package on different platforms such as a Windows computer or an iOS device. Configuration Manager can then use rules that you configure to determine which software package gets installed on which device.
- Applications in Configuration Manager support user-centric management so that you can associate specific users with specific devices. Instead of having to remember the name of a user’s device, you can now deploy software to the user and to the device.
- Applications in Configuration Manager support state-based monitoring, by which you can track the last application deployment state for users and devices. The state messages display information about individual devices.
5.2.2.2 VMWare Mirage

On the other hand VMware® Horizon Mirage™ is very specific to Centralized Desktop Image management. Mirage provides a layered image management solution that separates a desktop, laptop, or virtual endpoint into logical layers that are owned and managed by your IT organization.

You can update IT-managed layers while maintaining end-user files and personalization. To maximize end-user productivity, snapshots and backups of layered endpoint images enable quick recovery or rollback in case of failure. In the current context its worth to look at some of the features that will matter.

Features and Benefits

- **Layered Image management**: Update IT-managed layers while maintaining end-user files and personalization. Then, if an endpoint malfunctions, IT can restore the system layers on the endpoint to fix an issue, without compromising user applications and data.

- **Desktop Backup and Recovery**: Full PC snapshots and ongoing synchronization of changes in the data center ensure quick desktop recovery. By quickly restoring the system to a new device, you can minimize end-user downtime when a PC is lost, stolen or damaged.

- **Application layering**: Applications common to a certain team can be grouped into a single application layer and applied to all of the endpoints for a group of employees. VMware ThinApp is included in Horizon Mirage.

- **Scalability with small infrastructure footprint**: Horizon Mirage is designed to support up to 1,500 end users per Horizon Mirage server, and it can easily scale up to 20,000 end users per server cluster.

- **Branch Office Optimization**: Optimize branch office management by enabling any Horizon Mirage client endpoint to be a branch reflector. A Horizon Mirage branch reflector allows you to download any updates once from the Horizon Mirage server, followed by peer-to-peer updates to other Horizon Mirage clients in the branch office.
- **Flexible PC Image Deployment**: Provision centrally managed Horizon Mirage images to physical Windows desktops and laptops, or support “bring your own computer” initiatives by delivering IT-managed images to virtual machines with VMware Fusion Professional, which is included in Horizon Mirage.

- **Personalize Performance**: Enable end users to leverage the local computing resources of their desktops and laptops and maintain offline productivity. Images managed by Horizon Mirage install natively onto Windows desktops and laptops—or as virtual desktops in Fusion Professional running on Mac or Linux systems. Image layering gives end users the flexibility to personalize their systems.

- **Optimized and Adaptive Experience**: The Horizon Mirage client monitors the resources being used on an end user’s PC to ensure that the backup and synchronization processes never interfere with user productivity. Horizon Mirage dynamically adjusts CPU, RAM and network usage as needed to guarantee a seamless end-user experience.

- **Self Service File Access and Recovery**: The Horizon Mirage file portal enables end users to access any file on their endpoint from any Web browser. Users can also restore any file or directory with a few clicks.

**5.3 Applications**

**Application Virtualization**

Similar to Desktop Virtualization where we tried to decouple the OS dependency from the underlying hardware, Application Virtualization is aimed at decoupling the Application dependency on the OS. Thus the application need not be installed in its “traditional” way for it to be used. Application can be either streamed or remotely executed. This also makes it easier for the admins in terms of patching and making different versions of application available. Let us drill down more into different options from different vendors:

**5.3.1 Citrix XenApp**

Citrix XenApp is one of the most robust and reputed player in Application Virtualization. Applications are can be streamed to End user desktops or can be locally installed on Windows servers (XenApp Member Servers) and remotely displayed to users’ desktops and devices when they access it using the Citrix receiver Client. And if the applications are tightly dependent on Client OS then they are hosted on virtual desktops running Windows 8.1, Windows 7, Vista or XP and then remotely displayed to users’ physical or virtual desktops and devices via Citrix receiver client. XenApp has the capability to deliver HDX high-definition, any device native-experience.
5.3.2 Microsoft APP-V

Microsoft’s APP-V is another famous and powerful tool used for Application virtualization. App-V mainly uses Application streaming solution from Microsoft to deliver the application to End devices, which is again never installed and don’t conflict with other applications. In Application streaming, server sends client enough information to launch the application (usually as little as 10% of the application) and then streams the rest to the client in the background while the end user is working. Application streaming uses the Real Time Streaming Protocol (RTSP) and is often used in conjunction with desktop virtualization.

5.3.3 Microsoft RemoteApp

RemoteApp is built on the capabilities of the Session virtualization of Remote Desktop services in Windows Server. RemoteApp enables you to make programs that are accessed remotely through Remote Desktop Services appear as if they are running on the end user's local computer. Users can access RemoteApp and Desktop Connection through the Start menu on a computer that is running Windows® 7 or through the RD Web Access Web site. To some extent Citrix XenApp and Microsoft RemoteApp share similar capabilities, however Citrix XenApp provides lot more features in terms of manageability suitable for large scale deployments.
5.3.4 **VMware ThinApp**

VMware ThinApp offers a few capabilities that XenApp and App-V do not. For instance, it can deliver offline applications (doesn’t require Network connection even during its first execution), and it’s the most portable of the application virtualization tools. You can run ThinApp applications from almost anywhere because users don't need to install software or device drivers. Plus, they don't need admin rights to access applications from remote locations, such as an airport lounge. Still, some administrators say VMware ThinApp is more cumbersome to deploy. It's also trickier to manage applications because it doesn’t come with a centralized management platform.

5.3.5 **Windows Azure RemoteApp**

Windows Azure RemoteApp is nothing but Microsoft RemoteApp implementation on Windows Azure Cloud and available as a service for Consumers and the Enterprise customers. Users share common underlying infrastructure through Session Virtualization, which provides for a highly efficient application hosting environment. Azure RemoteApp uses RDP, a WAN ready protocol that is resilient to network latency and loss. The applications are delivered with a high fidelity, fast and fluid user experience appropriate for a variety of interactive scenarios and content, from routine text input to multimedia.

5.4 **User Settings**

**User State Virtualization**

User state virtualization involves separating user settings and data from the user's personal computer and storing these settings and data centrally on a network server. The term user settings refers to the various kinds of customizations that a user might perform on a computer running
Microsoft Windows. The term user data refers to the documents and other files that a user can create, modify, save and delete on their computer. Below sections covers some of the products available to achieve this.

5.4.1 Microsoft User Experience Virtualization (UE-V)

Microsoft User Experience Virtualization is an enterprise-scale user state virtualization solution that delivers a user’s personal Windows experience across many devices, is simple for IT to deploy, and easily integrates with existing infrastructure. Some of the advantages that are more relevant in our scenario are:

- Microsoft User Experience Virtualization automatically delivers a personal experience to Windows*-based devices, giving users the flexibility to work from anywhere.
- Operating system (OS) experience can roam between multiple versions of Windows,* providing users a consistent look and feel.
- Smart synchronization policies determine when and where to synch application and OS experience, helping ensure seamless personalization and quick loading, while minimizing corruption.
- IT can use the in box settings location templates for Windows*, Office 2010 and 2007, and Internet Explorer 8, 9, and 10 to automatically identify the most common paths for application and OS settings.
- If a user accidently applies unwanted changes, IT can simply roll back to the initial state.
- Minimize user support requests and help ensure a consistent agent configuration by using the Configuration Pack for Microsoft System Center 2012 Configuration Manager or group policy.

* Windows 7, Windows 8, Windows Server 2008 R2 and Windows Server 2012, x86 and x64 only
5.4.2 AppSense DesktopNow Plus

AppSense DesktopNow provides capability for IT to centrally manage, setup & configure, lockdown, tune and personalize any desktop regardless of device, platform, delivery mechanism or location. AppSense DesktopNow adds the ability for your users to securely access their data from anywhere, regardless of the device they’re on. It also has certain unique features and tools to enable emerging DaaS / service provider business models. AppSense desktop & data solutions are validated by leading vendors such as Microsoft, Citrix, Cisco and VMware, ensuring a secure, tailored user experience across all platforms and proven to improve user productivity and security.

AppSense completely separates the user from the underlying platform so their persona can be applied instantly to any technology your organization deploys: users can be painlessly upgraded to new operating systems; migrated from physical to virtual and back again; and new applications can be speedily rolled out.

5.4.3 User Profile Disks / Persistent Disks / Personal Disks for VDI or Session Desktops

User Profile Disks (Microsoft’s terminology), Persistent Disks (VMware’s terminology) and Personal Disks (Citrix’s terminology) are the way to provide the User Experience Virtualization to the VDI or Session based environment without any additional cost overhead. They can also be intelligently combined along with Folder redirection and Offline Folders to make it even more effective implementation with higher data protection. These disks are usually mounted separately as additional disks whenever user logs in. There is separate disk with pre allocated space for each and every user. With Microsoft’s UPD there is lesser capability in managing the UPD’s as compared to VMware or Citrix who provide greater management features.

5.4.4 Folder Redirection (FR)

Folder Redirection in itself would not qualify completely for User state Virtualization. However if the purpose is to only provide the consistent Data availability experience then it will be an easier alternative to look for. Windows supports the redirection of the following folders within a user's profile: AppData (Roaming), Desktop, Start Menu, Documents, Pictures, Music, Videos, Favorites, Contacts, Downloads, Links, Searches, and Saved Games. Redirection of these folders can be
configured using Group Policy settings found under User Configuration\Policies\Windows Settings\Folder Redirection. FR can be combined with UPD/ Persistent Disks / Personal disk to provide an additional Data protection.

5.4.5 Offline Files

Similar to FR, Offline Files can be a feature that will be part of the strategy for User State Virtualization. Offline Files is a feature of Windows 7 Professional, Enterprise and Ultimate edition that allows users to access and work with files stored on shared folders on network servers even when those shared folders become unavailable. Offline Files maintains productivity by enabling users to work with locally cached copies of files stored on network shares when the server goes down or the network is unavailable for some reason. It also enables mobile workers to work with files stored on network shares while they are travelling and unable to connect to the corporate network.

Offline Files complements Folder Redirection to make user state virtualization more robust. This is because while Folder Redirection alone can make user data accessible from any computer on the network, users will not be able to access their data if the server hosting the redirected folder goes down or if the network is unavailable. By combining Folder Redirection with Offline Files however, you can ensure that end users remain productive even when a server is down or the network is unavailable.

6 Technology Stack for On-Premise and Cloud

In previous sections we have covered all the different options available across all the layers. Below Table summarizes all the possible technology Stack available under both On-Premise and Cloud Options across different Product Vendors. This will serve as a reference during finalizing one of the Technology Stack.

<table>
<thead>
<tr>
<th>De-Coupling Layer</th>
<th>Product Vendor</th>
<th>On -Premise</th>
<th>Cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Virtualization</td>
<td>Microsoft</td>
<td>Remote Desktop Services</td>
<td>Azure Desktop hosting Service</td>
</tr>
<tr>
<td></td>
<td>VMware</td>
<td>VMware Horizon View</td>
<td>VMware Horizon Air Desktops</td>
</tr>
<tr>
<td></td>
<td>Citrix</td>
<td>Citrix XenDesktop and XenApp</td>
<td>Azure Desktop hosting Service with Citrix for Presentation layer</td>
</tr>
<tr>
<td></td>
<td>Amazon</td>
<td>Not Applicable</td>
<td>Amazon Workspaces</td>
</tr>
<tr>
<td>Centralized Desktop management</td>
<td>Microsoft</td>
<td>SCCM 2012</td>
<td>SCCM 2012 with Windows Intune</td>
</tr>
<tr>
<td></td>
<td>VMware</td>
<td>VMware Horizon Mirage</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
7 Conclusion

While transitioning to the Future state of End user computing environment, It’s recommended to reuse the existing IT infrastructure wherever possible to make the transition cost effective. However if there is a need to completely adapt the new technology, then it is ideal to always go with the non-critical approach rather than going other way and failing. All the technologies discussed above have their own pros and cons, especially some of them still being niche in the market with not many use cases available to understand their limitations, the inherent risks should be factored clearly. It is most likely possible that the combination of options may make more sense than to round it off on just one of them. With this background, vendor agnostic view of each layer is outlined below.

7.1 Hardware

- It is recommended to assess the environment using tools such as Lakeside’s SysTrack which will give complete picture of what can be virtualized and what kind of option will be more suitable.
- Investment on Hardware portfolio can be reduced and resource optimization can be achieved by providing access to Desktop Virtualization either through Thin Clients, Laptops / Desktops / Smart devices and also Support Bring your Own Device (BYOD).

7.2 Operating System

Wherever the current environment is running on a tightly coupled EUC environment that has lot of management overhead in maintaining and patching the Image. Both desktop Virtualization and Centralized Image management options can address the challenges with respect to Operating system in following ways:

**Desktop Virtualization:**

- Eliminate Image management overhead by adopting to Session based Desktop Virtualization. Azure based Windows Desktop hosting service or Amazon Workspaces can be evaluated. Patch management and rebuilding image is a Centralized activity thus eliminating the need to perform on the end points. There is no delay in boot time in Virtual environment as it provides a faster access and consistent experience to every user from anywhere.
- VMware Air or On-premise Desktop Virtualization solutions can be explored if the need is for dedicated Virtual Desktop Infrastructure.

**Centralized Desktop Management:**

- If the organizations have already invested on the Desktops/ Laptops as part of their PC refresh lifecycle and if they own System Center suite, then they can leverage their existing investment on
SCCM 2012, whereby the capabilities of SCCM can be extended to the address the imaging and patch management challenges in the environment. Some of the recommendation would be having a distribution point for each region, All the Laptop / desktop deployment can be performed over the Network using PXE boot and Lite Touch installation. This will make the entire Image rebuild an automated task with least user intervention. Enforce Compliance settings that can help you to assess, track, and remediate the configuration compliance of client devices in the enterprise.

- Alternatively, organizations can evaluate VMware Mirage, which in addition to maintaining a Centralized Virtual Desktop (CVD) Images will provide some of the below benefits which SCCM lacks:
  - Provide Mac Users the capability to run the Windows OS on their Mac Laptop
  - Provide an easy Backup / retrieval mechanism for all the Laptops and Desktops
  - Enable End Users to work offline while still synchronizing the Image updates whenever they are online.

7.3 Application
The suggestions around Application technology stack listed below should be clearly tied with the Strategy that is finalized for the Desktop Virtualization or centralized Desktop Image management:

- Citrix XenApp provides a comprehensive Application Virtualization solution that has seen lot many implementation around Enterprise world with enough supporting Case studies and success stories.
- Microsoft APP-V is another alternative and works well along with SCCM suite to distribute all the application dynamically to relevant End Users without needing their intervention and also has enough case studies to back it for Enterprise implementation.
- Where Organizations own licenses for both App-V and XenApp, They can be leveraged to work together, meaning publish streamed apps on to a XenApp farm and make them available on Citrix portal. This way advantages of both XenApp and AppV can be benefited together.
- VMware ThinApp is suitable for the environment where it is required to make your application more portable and mobile.
- Microsoft RemoteApp is a cost effective approach of implementing Application Virtualization. This has been in existence since long time in form of Terminal services as TS RemoteApp, however it lacks lot of capabilities or scenarios that are available in XenApp or App-V or ThinApp
- Azure RemoteApp should be considered if its is in line with Organization’s business requirement of Public Cloud Adoption. As this is still niche in the market and yet to mature as a service offering. The Capabilities can however be evaluated as Proof of Concept(POC) to understand its relevance for an organization.

7.4 User Settings
- Folder redirection along with Offline files is something that can be readily implemented if not done already, as this can be very beneficial for mobile users like Marketing and Business users and also to centralize the data repository.
- To enable the End Users with Mobility in terms of their System and Application settings, enterprise level products like AppSense/Immidio (Immidio is not discussed in detail in this document) provide greater flexibility compared to Microsoft’s UE-V.
For Virtual Desktops, UPD / Personal / Persistent disks technologies can be implemented for better user experience across devices.

8 References


http://aws.amazon.com/workspaces/faqs/

http://www.vmware.com/products/horizon-air-desktops/


http://www.appsense.com/products/desktop/desktopnow

Image Reference:

http://img2.findthebest.com/sites/default/files/1765/media/images/416067_i0.jpg


http://www.hochwarth-it.de/de/serverloesungen/software/citrix-xenapp.html

http://www.metsistem.com/images/app-middle.png

http://www.ndm.net/vmware/VMware-ThinApp/thinapp-features


http://i.technet.microsoft.com/dynimg/IC696434.gif